

# MAX31889 Evaluation System

Evaluates: MAX31889

## General Description

The MAX31889 evaluation system (EV system) provides a single platform to evaluate the MAX31889, a temperature sensor with  $\pm 0.3^{\circ}\text{C}$  accuracy. The EV system consists of two boards connected through headers, a MAX32630FTHR microcontroller board, and the MAX31889 EV kit board. The MAX32630FTHR contains the firmware necessary to use the PC GUI program and also provides power to the MAX31889 EV kit board. The MAX31889 EV kit board ships with jumpers preinstalled to allow quick evaluation of the MAX31889.

## Features

- Easy to Reach Test Points
- Fully Assembled and Tested
- Windows® 7, 8, and 10-Compatible Software

## MAX31889 EV System Files

FILE	DESCRIPTION
MAX31889EVKit.exe	PC GUI Program
MAX31889_EVKIT_A.zip	Sch, BOM, PCB Layout
MAX32630FTHR.zip	Sch, BOM, PCB Layout

The GUI and other documentation to use this EV System are available in the [MAX31889EVSYS# EV System Design Resources](#) tab.

[Ordering Information](#) appears at end of data sheet.

## MAX31889 EV System Photo



Windows is a registered trademark of Microsoft Corporation.

## Quick Start

### Required Equipment

**Note:** In the following sections, software-related items are identified by bold text. Text in **bold** refers to items directly from the install of EV system software. Text that is **bold and underlined** refers to items from the Windows operating system.

- MAX31889 EV kit board
- MAX32630FTHR
- Micro USB cable
- Windows PC with USB port
- MicroSD card (optional)
- Lithium-ion battery (optional)

### Procedure

The EV system is tested and ships in two pieces: MAX31889 EV kit board, and MAX32630FTHR.

Follow the steps below to verify board operation:

- 1) Plug the MAX32630FTHR into the MAX31889 EV kit board.
- 2) Set the EV system hardware on a nonconductive surface to ensure nothing on the PCBs short together.
- 3) Connect the EV system hardware to a PC with the provided USB cable. Attach the Micro USB end to the MAX32630FTHR and the other end to the PC. LED D1 on the MAX32630FTHR begins blinking light blue.
- 4) Windows should automatically begin installing the necessary device driver. Once the driver installation is complete, a Windows message appears near the system icon menu, indicating the hardware is ready to use. Do not attempt to run the GUI prior to this message. If you do, then close the application and restart it once the driver installation is complete. On some versions of Windows, administrator privileges might be required to install the USB device.
- 5) Once the device drivers have been installed, download the software from [MAX31889EVSYS# EV system Design Resources](#) tab and extract it to a temporary folder.

- 6) Open the extracted ZIP folder and double-click the .EXE file to run the installer. If a message box stating **The publisher could not be verified. Are you sure you want to run this software?** appears, select the **Yes** option.
- 7) When the installer GUI appears, click **Next**. Select the installation paths and whether a shortcut should be created on the desktop. When prompted, press **Install**. Once complete, click **Close**.
- 8) If a shortcut was created, double-click on the shortcut to start the GUI. Alternatively, go to **Start | All Programs**. Look for the **MAX31889EVKitTool** folder and click on the **MAX31889EVKitTool.EXE** file inside the folder.
- 9) When the GUI appears, the text in the right field of the bottom status bar displays **Connected**. If the GUI displays **Not Connected**, ensure the flex PCB is properly connected and power-cycle the MAX31889 EV system.

## Detailed Description of Software

### Software Startup

If the EV system is connected while the software is open, the software first initializes the hardware to communicate. The software then reads the device registers and updates all of the associated control fields displayed on the GUI.

Once an EV system is connected, by selecting **Enable Temperature**, the GUI automatically sets the device registers and begins taking temperature measurements.

If the EV system is not connected on startup, the GUI starts up with no devices displayed in the **Devices** section of the GUI and no temperature reading in the **Selected Device** section. The status bar at the bottom of the GUI states **Not Connected**.

### ToolStrip Menu Bar

The **ToolStrip** menu bar ([Figure 1](#)) is located at the top of the GUI window. This bar comprises the **File**, **Device**, **Logging**, and **Help** menus whose functions are detailed in the following sections.

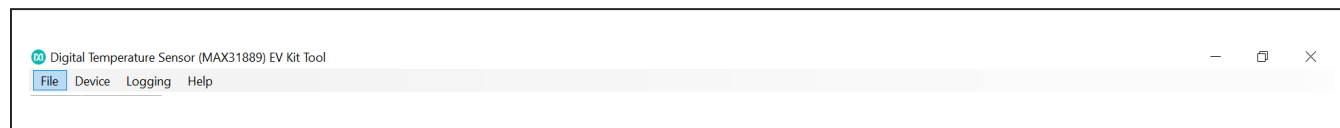


Figure 1. ToolStrip Menu Bar

File Menu

The **File** menu contains the option to exit out of the GUI program.

Device Menu

The **Device** menu provides the ability to connect or disconnect an EV system to the GUI. If a board is disconnected while the GUI is open, the GUI displays **Hardware Not Connected** in the lower right corner. If the device is then plugged back in, the user can navigate to the **Device** menu and select **Connect**. If successful, the bottom right corner of the GUI reads **Device Connected**.

Logging Menu

The **Logging** menu provides two ways to export each data sample that is being measured by the device. The first logging option is **File Logging**. Selecting either log option opens a prompt asking to select a device from which to log data. Next, a prompt appears that allows the user to choose a name for the comma-separated value (CSV) log file, as well as the location to save the generated file. [Figure 2](#) and [Figure 3](#) show the GUI when creating a log file. The GUI disables file logging after one monitoring session and a new file must be generated through the **Logging** menu to log another dataset.

The second logging option is **MicroSD Logging**. MicroSD logging provides the ability to operate the EV system without a connection to a host PC or power supply. First, insert a microSD card into the connector on the underside of the MAX32630FTHR. After selecting the logging interval and writing the selection to the microSD card as seen in [Figure 4](#), connect a 3.7V lithium-ion (Li+) battery with a JST PH connector to the MAX32630FTHR and then disconnect the board from the host PC. Refer to the MAX32630FTHR data sheet for details on connecting a

Li+ battery. Press SW2 to start saving measurements to the SD card. Pressing SW2 again stops measurements.

To transfer the logged data from the MicroSD card to a file on a PC, reconnect the MAX31889 EV system to the PC and select microSD card logging from the **Logging** menu. Select the **Save to File** option and a prompt appears to name the log file ([Figure 3](#)). For subsequent logging sessions, **Clear Log** should be pressed on the **Setup MicroSD Logging** screen to prevent multiple datasets from being recorded to the same log file.

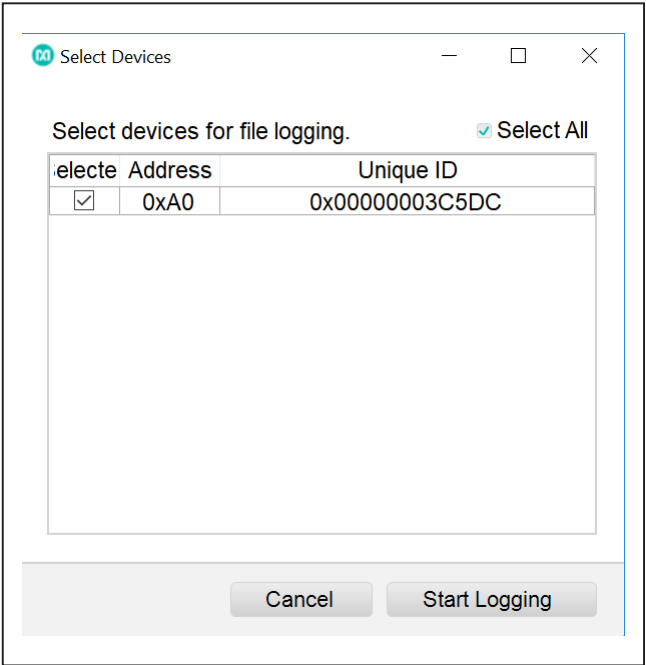


Figure 2. Device Select Screen for Logging

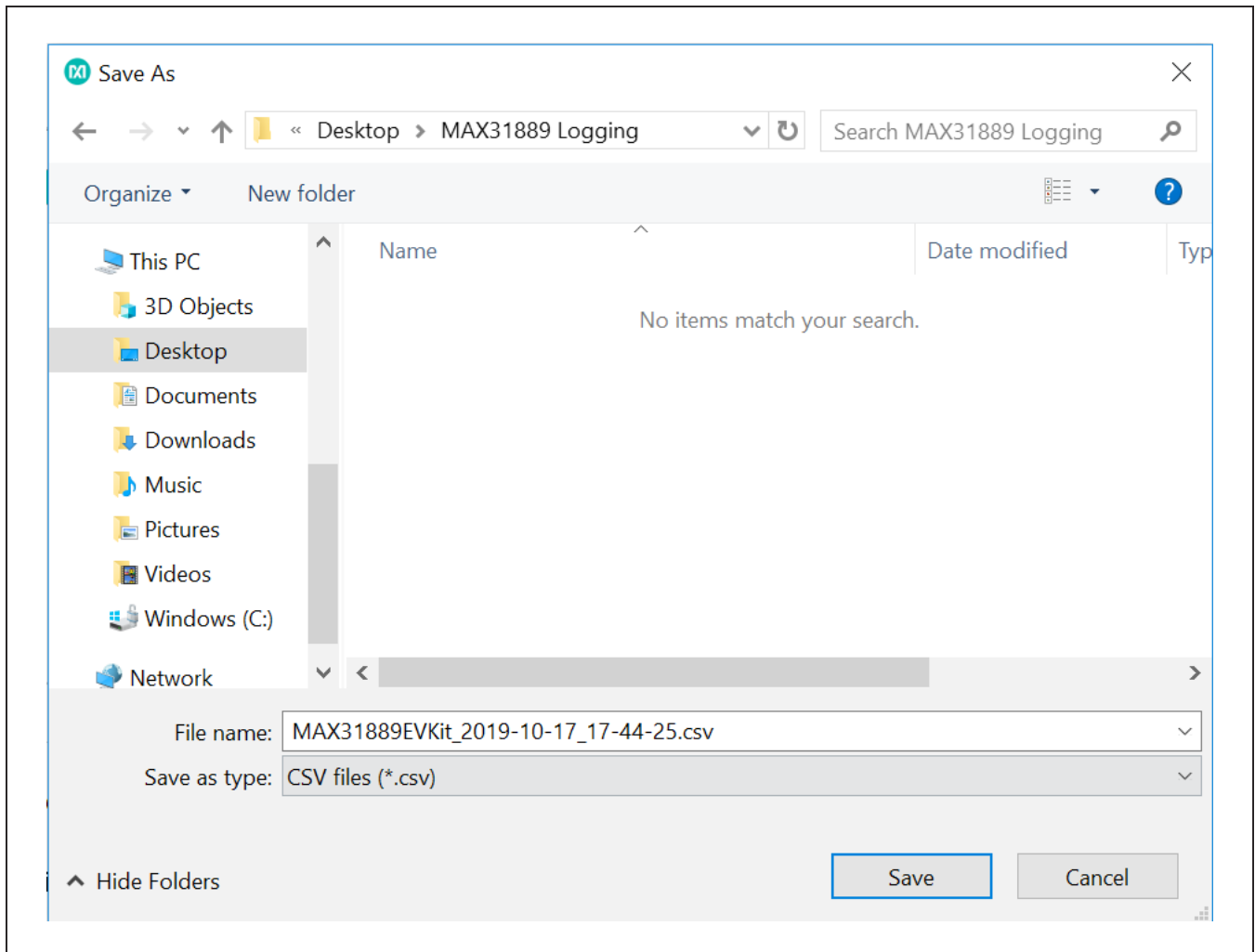


Figure 3. File Naming Screen for Logging

Help Menu

The **About** option displays the GUI splash screen, which names the GUI version being used.

Tab Control

The main interface structure of the GUI consists of a tab control where each tab contains controls relevant to various blocks of the device. Changing these interactive controls triggers a write operation to the MAX31889 to update the register contents. Likewise, these controls are refreshed when reading from the device. The **Register Map** tab allows the user to read and write to individual registers.

General Tab

The **General Tab** (Figure 5) displays a general overview of the MAX31889. The tab provides a list of devices currently connected, temperature data for a selected device, as well as controls for select registers.

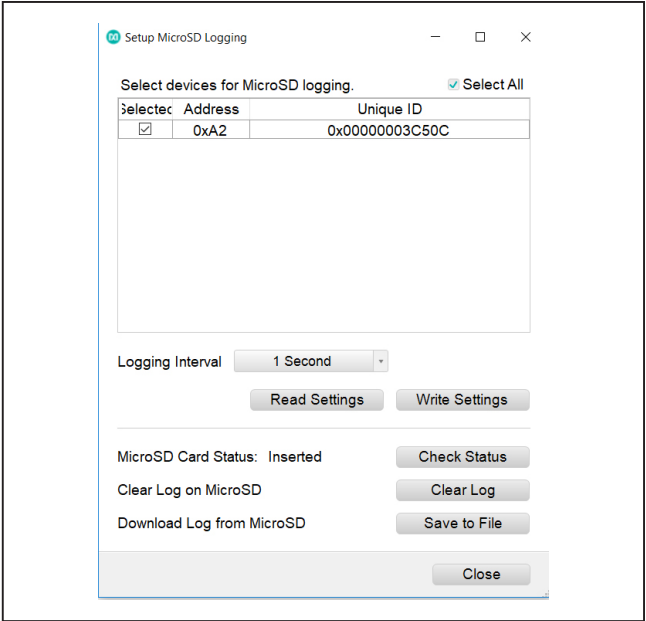


Figure 4. MicroSD Logging Prompt

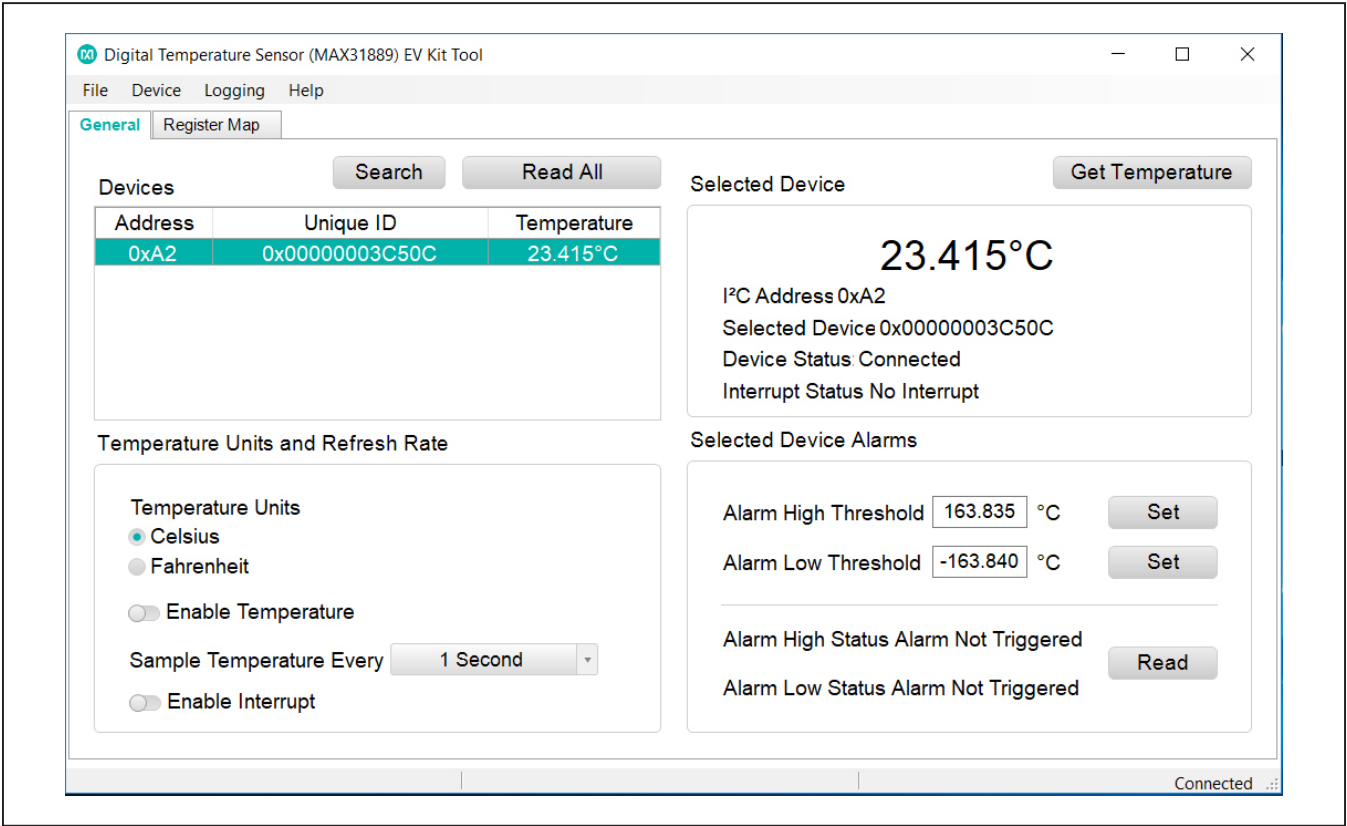


Figure 5. General Tab

Register Map Tab

The **Register Map** tab (Figure 6) provides more direct access to the internal registers of the MAX31889. From this tab, it is possible to read the contents of individual registers and to manually enter the desired bit settings for a write operation. For the register address selected in the table on the left, the contents are displayed at the bottom of the tab and visualized as bold or non-bold bit names.

When a bit is bold, its value is 1. Otherwise, the bit is 0. Full descriptions of each bit are available in the table on the right for quick reference. Pressing **Read** reads the selected register highlighted in teal. Pressing **Read All** reads all registers and updates their values in the **Register Map** tab. To write to a register, set the desired bit values by clicking on the bit names to make bold or non-bold and then press **Write**.

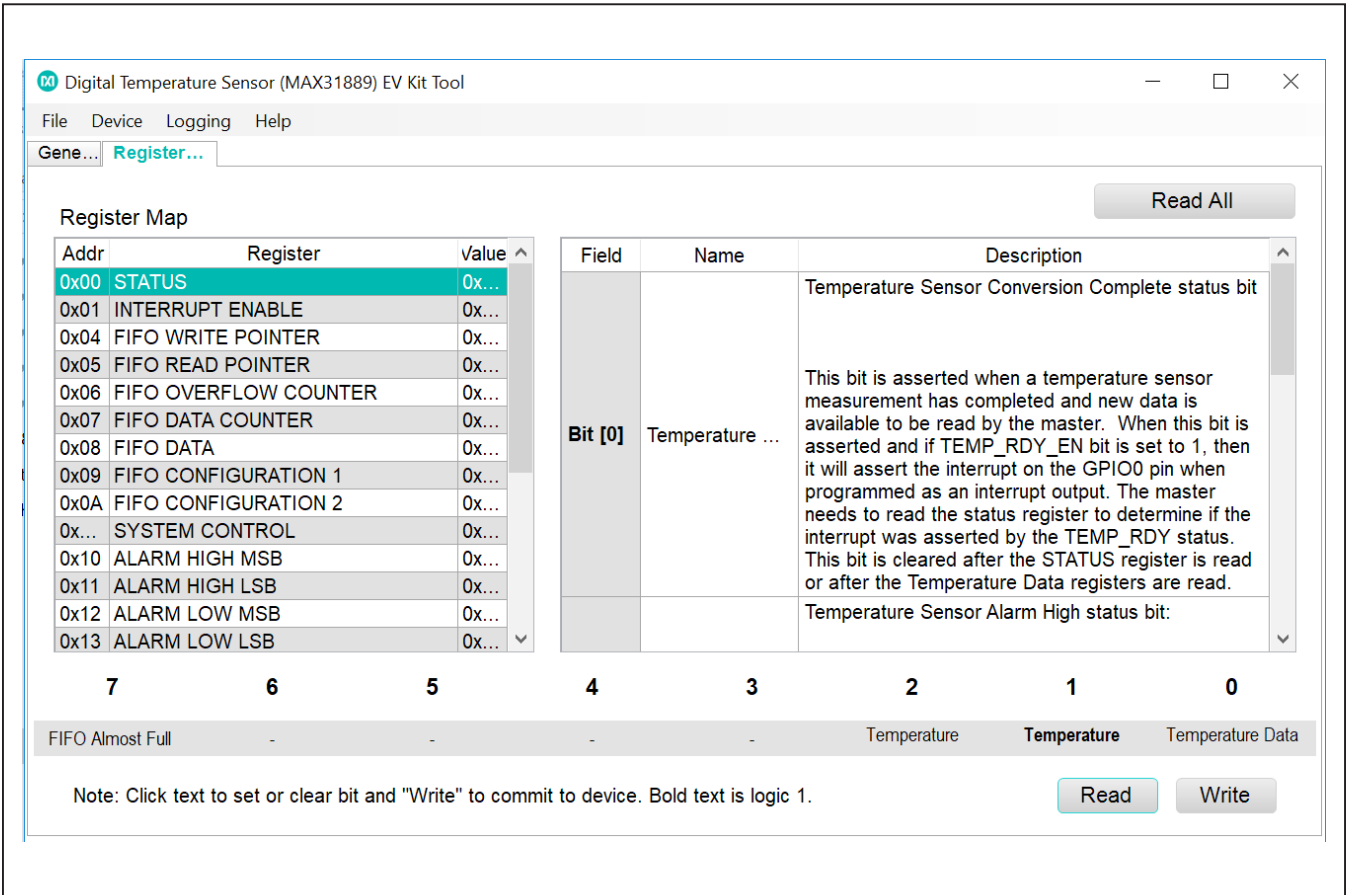


Figure 6. Register Map Tab

## Detailed Description of Hardware

The MAX31889 EV system provides a single platform to evaluate the functionality and features of the MAX31889. The board contains jumpers to test the MAX31889 under several conditions. A list of all jumpers and their respective functions is available in [Table 1](#).

**Table 1. Description of Jumpers**

JUMPER	DESCRIPTION
JP3	Connect SCL to 4.7kΩ pullup
JP2	Connect SDA to 4.7kΩ pullup
JP1	Connect VCC to 1.8V/3.3V of the MAX32630FTHR

## Component Suppliers

SUPPLIER	WEBSITE
Keystone	<a href="http://www.keyelco.com">www.keyelco.com</a>
Maxim Integrated	<a href="http://www.maximintegrated.com">www.maximintegrated.com</a>
Molex	<a href="http://www.molex.com">www.molex.com</a>
Murata	<a href="http://www.murata.com">www.murata.com</a>
Panasonic	<a href="http://www.industrial.panasonic.com">www.industrial.panasonic.com</a>
Samtec	<a href="http://www.samtec.com">www.samtec.com</a>
Sullins	<a href="http://www.sullinscorp.com">www.sullinscorp.com</a>
TE Connectivity	<a href="http://www.te.com">www.te.com</a>

**Note:** Indicate that you are using the MAX31889 when contacting these component suppliers.

The EV system utilizes the MAX32630FTHR Arm® Cortex®-M4F microcontroller for wearables to interface with the GUI and optionally provides power to the MAX31889. The MAX32630FTHR operates either from a host PC or directly from a Li+ battery. If an SD card is present in the MAX32630FTHR, pressing SW2 on the MAX32630FTHR initiates measurements and saves log files to the SD card. Logging is stopped by pressing SW2 a second time.

## Powering the EV system

The MAX31889 EV system is powered directly from the MAX32630FTHR through either a Li+ battery or a USB to Micro USB cable. JP1 must be connected to the 1.8V option in order to supply power from the MAX32630FTHR. JP2 and JP3 must each have a shunt connected to connect the serial data (SDA) and serial clock (SCL) lines from the MAX32630FTHR to the MAX31889 IC.

## Ordering Information

PART	TYPE
MAX31889EVSYS#	EV System (EV Kit + Master Board)
MAX31889EVKIT#	EV Kit
MAX32630FTHR#	Master Board

#Denotes RoHS compliance.

Arm and Cortex are registered trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

# MAX31889 Evaluation System

Evaluates: MAX31889

## MAX31889 EV System Bill of Materials

Other documentation to use this EV system are available in the [MAX31889EVSYS# EV System Design Resources](#) tab.

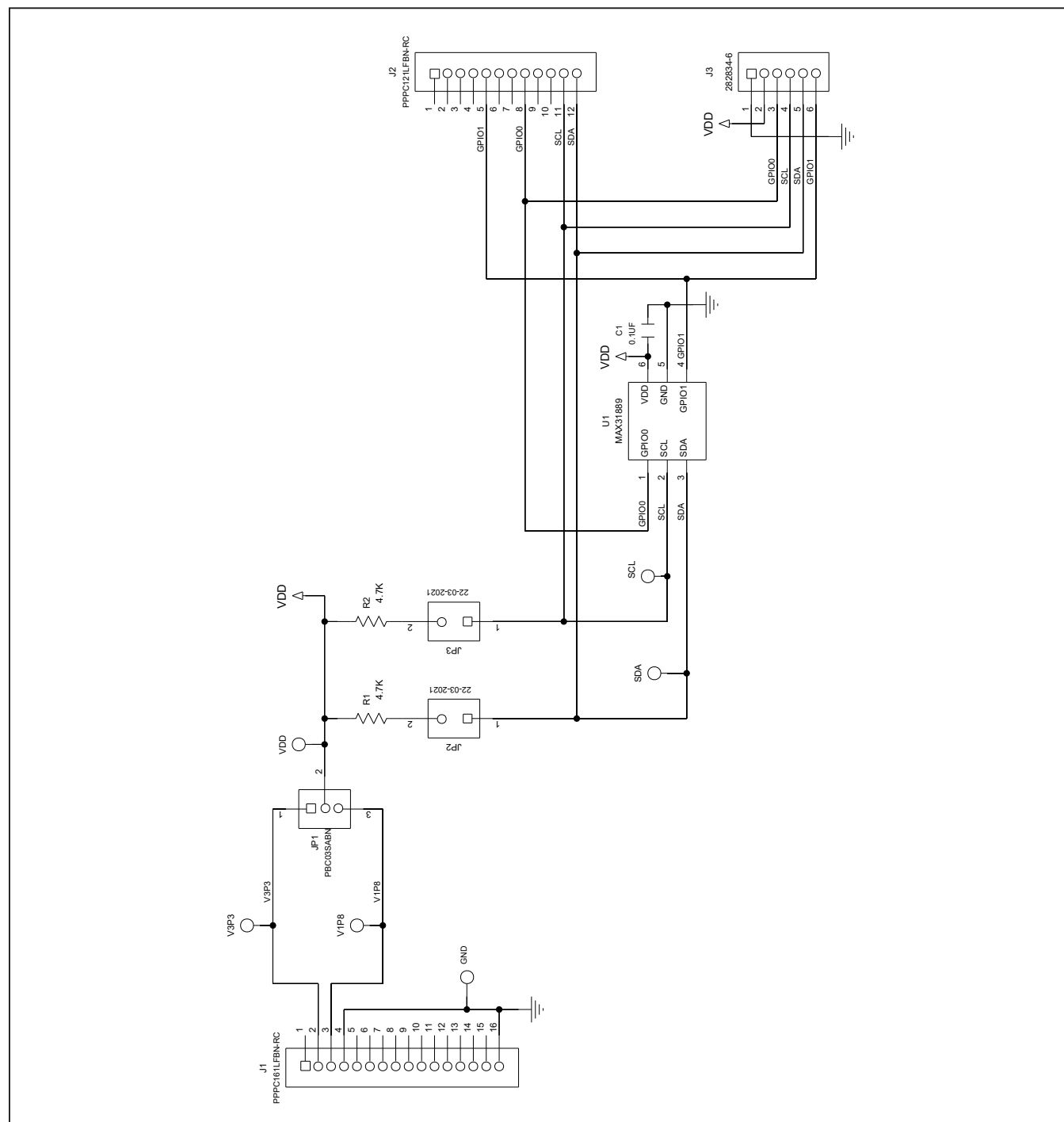
### MAX31889EVKIT# Bill of Materials

ITEM	QTY	REF DES	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
1	1	C1	EC111000003641	GCM155L81E104KE02	MURATA	0.1UF	CAP; SMT (0402); 0.1UF; 10%; 25V; X8L; CERAMIC CHIP	
2	3	GND, SCL, SDA	02-TPCOMP5006-00	5006	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN; NOT FOR COLD TEST	
3	1	J1	01-PPPC161LFBN16P-19	PPPC161LFBN-RC	SULLINS ELECTRONICS CORP.	PPPC161LFBN-RC	CONNECTOR; FEMALE; THROUGH HOLE; LFB SERIES; 2.54MM CONTACT CENTER; STRAIGHT; 16PINS	
4	1	J2	01-PPPC121LFBN12P-19	PPPC121LFBN-RC	SULLINS ELECTRONICS CORP	PPPC121LFBN-RC	CONNECTOR; FEMALE; THROUGH HOLE; HEADER FEMALE; STRAIGHT; 12PINS	
5	1	J3	01-28283466P-25	282834-6	TE CONNECTIVITY	282834-6	CONNECTOR; FEMALE; THROUGH HOLE; TERMINAL BLOCK PCB MOUNT SIDE WIRE ENTRY STACKING; STRAIGHT; 6PINS	
6	1	JP1	01-PBC03SABN3P-21	PBC03SABN	SULLINS	PBC03SABN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS	
7	2	JP2, JP3	01-220320212P-21	22-03-2021	MOLEX	22-03-2021	CONNECTOR; SIP; THROUGH HOLE; MALE; STRAIGHT THROUGH; 2PINS	
8	2	R1, R2	80-004K7-Q6	ERJ-2GEJ472	PANASONIC	4.7K	RESISTOR; 0402; 4.7K OHM; 5%; 200PPM; 0.10W; THICK FILM	
9	3	SU1-SU3	02-JMPFS1100B-00	S1100-B; SX1100-B; STC02SYAN	KYCON; KYCON; SULLINS ELECTRONICS CORP.	SX1100-B	TEST POINT; JUMPER; STR; TOTAL LENGTH=0.24IN; BLACK; INSULATION=PBT; PHOSPHOR BRONZE CONTACT=GOLD PLATED	
10	1	U1	00-SAMPLE-01	MAX31889	MAXIM	MAX31889	EVKIT PART - IC; MAX31889; +/- 0.25 DEGC ACCURATE I2C TEMPERATURE SENSOR; PACKAGE OUTLINE DRAWING: 21-0164; PACKAGE LAND PATTERN: 90-0004; PACKAGE CODE: L622-1	
11	3	V1P8, V3P3, VDD	02-TPCOMP5005-00	5005	KEYSTONE	N/A	TEST POINT; PIN DIA=0.125IN; TOTAL LENGTH=0.35IN; BOARD HOLE=0.063IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH; RECOMMENDED FOR BOARD THICKNESS=0.062IN	
12	1	PCB	EPCB31889	MAX31889	MAXIM	PCB	PCB:MAX31889	-
TOTAL	20							

DO NOT PURCHASE(DNP)								
ITEM	QTY	REF DES	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
TOTAL	0							

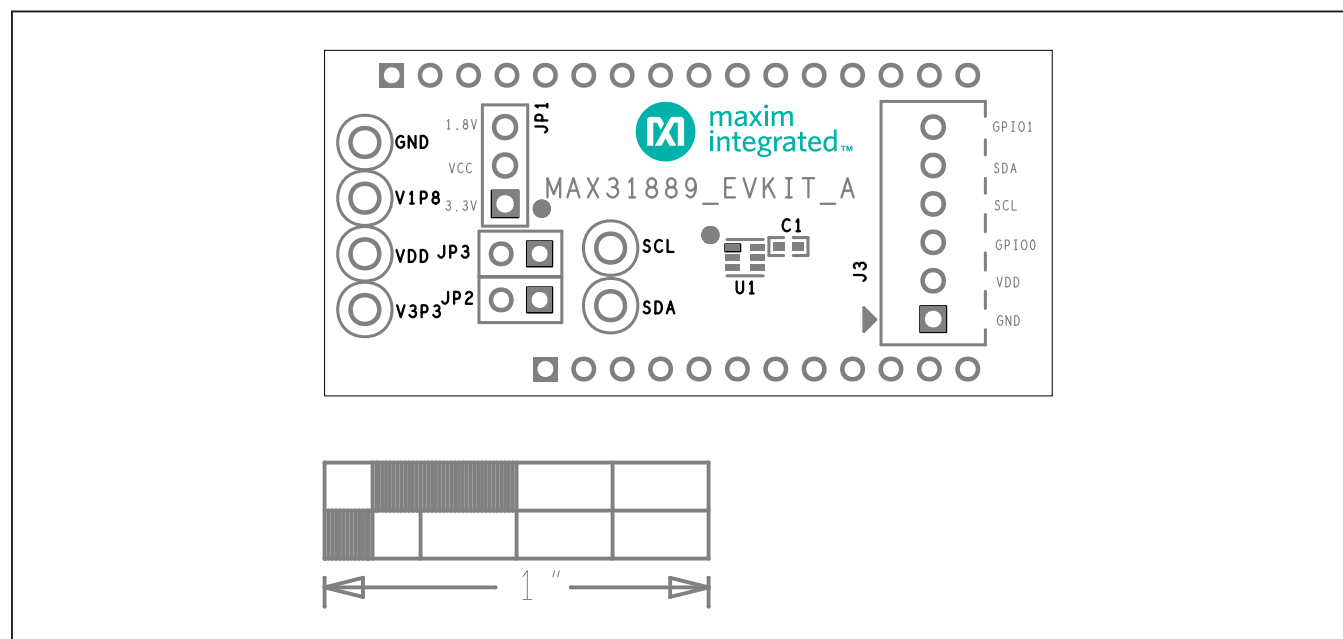
PACKOUT (These are purchased parts but not assembled on PCB and will be shipped with PCB)								
ITEM	QTY	REF DES	MAXINV	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION	COMMENTS
TOTAL	0							

Other documentation to use this EV system are available in the [MAX31895SYS# EV System Design Resources](#) tab.

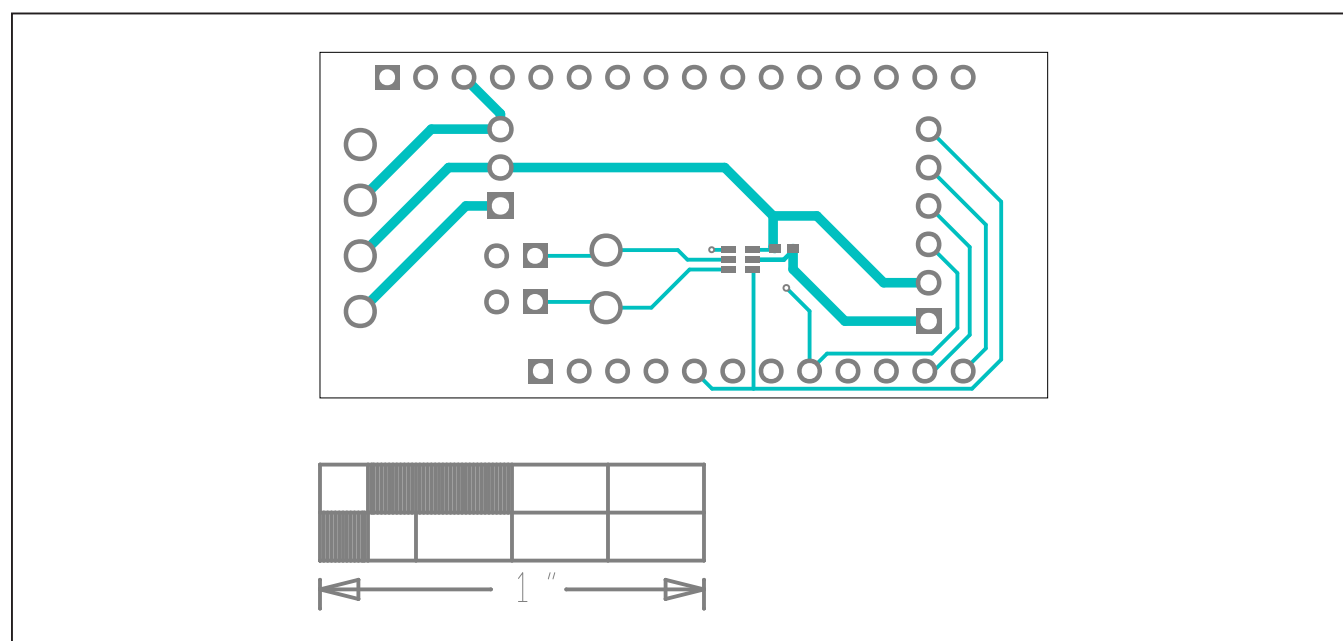


## MAX31889 EV System PCB Layout Diagrams

Other documentation to use this EV System are available in the [MAX31889EVSYS# EV System Design Resources](#) tab.

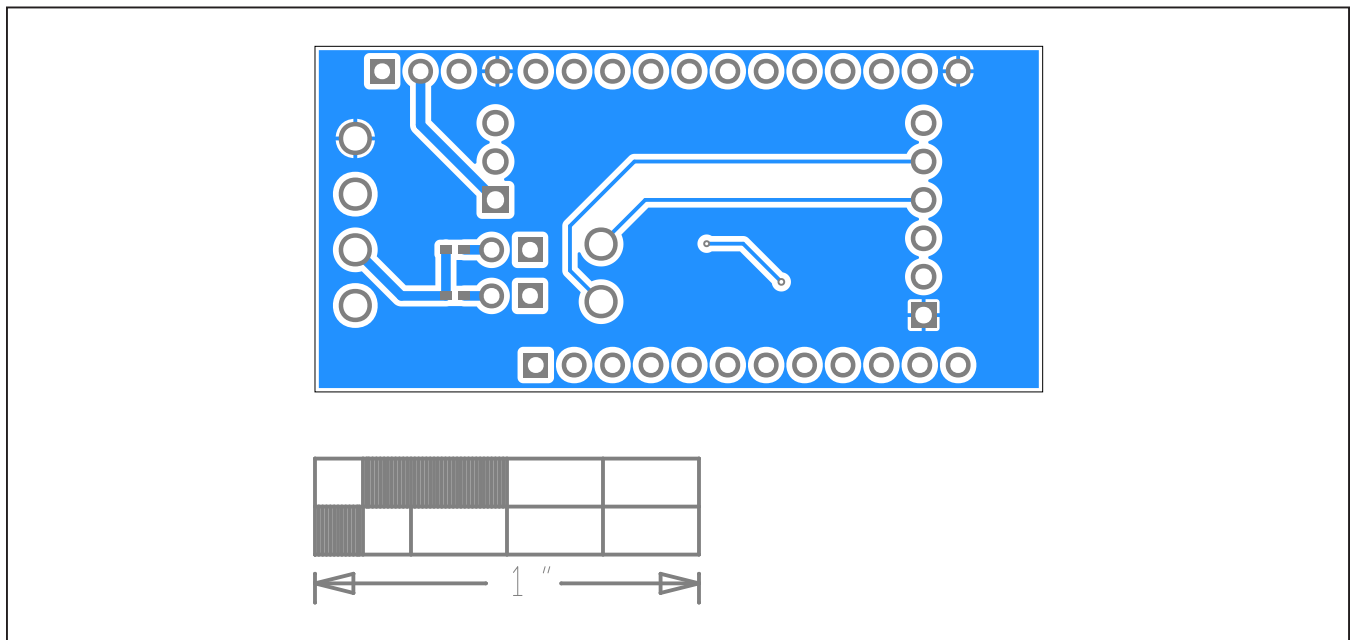


MAX31889 EV Kit Interface Board PCB Layout—Top Silkscreen

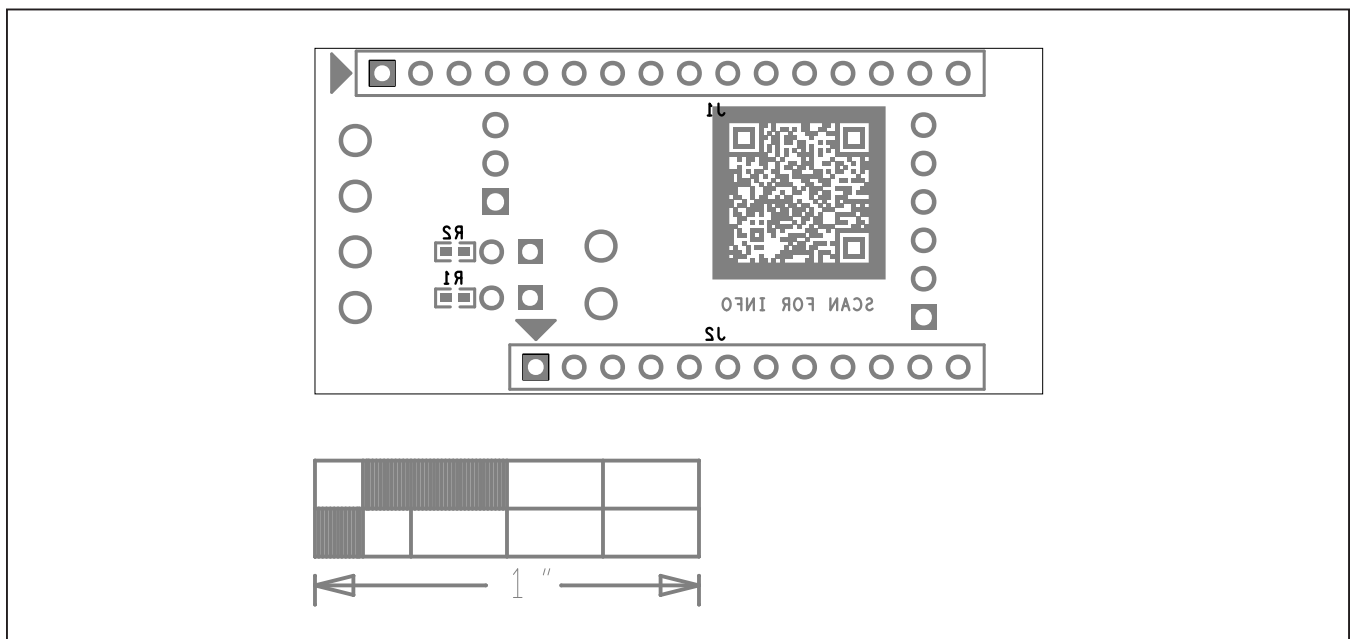


MAX31889 EV Kit Interface Board PCB Layout—Top View

## MAX31889 EV System PCB Layout Diagrams (continued)



MAX31889 EV Kit Interface Board PCB Layout—Bottom View



MAX31889 EV Kit Interface Board PCB Layout—Bottom Silkscreen

## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/19	Initial release	—
1	8/20	Updated <i>Detailed Description of Software</i> section, replaced figure 4 and 5, updated links and PCB layout diagrams	2, 5, 9–11
2	11/20	Updated <i>Ordering Information</i> table, added heading MAX31889EVKIT# Bill of Materials to the <i>MAX31889 EV System Bill of Materials</i> section	7, 8

For pricing, delivery, and ordering information, please visit Maxim Integrated's online storefront at <https://www.maximintegrated.com/en/storefront/storefront.html>.

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